

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

DIVISION ON ENGINEERING AND PHYSICAL SCIENCES
BOARD OF PHYSICS AND ASTRONOMY

Committee on Elementary Particle Physics – Progress and Promise

Meeting No. 4

December 13, 2022

Virtual Meeting

ALL TIMES IN US EASTERN STANDARD TIME (UTC-7:00)

This agenda is a draft, subject to change, and was last updated on 12/13/2022 9:20 AM

AGENDA

TUESDAY, DECEMBER 13, 2022

OPEN SESSION

Livestream Link: <https://vimeo.com/event/2698980>

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| 10:00 AM | Welcome to the Meeting; Brief Remarks on Meeting Agenda | <i>Dr. Maria Spiropulu, Co-Chair / Dr. Michael Turner, Co-Chair /</i> |
| 10:05 AM | Discussion with Particle Physics Project Prioritization Panel (P5) And High Energy Physics Advisory Panel (HEPAP) Chairs* (10 minute presentation & 20 minute discussion period) | <i>Dr. JoAnne Hewett, Chair, HEPAP / Dr. Hitoshi Murayama, Chair, P5</i> |
| 10:35 AM | Break | |

Large Accelerators Focused Session

Sessions Moderated by Prof. Maria Spiropulu, EPP Co-Chair and Dr. Fulvia Pilat, EPP Member

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| 10:45 AM | Panel 1: Feasibility of a National Future Collider Accelerator R&D Program in a Global Context (45 min moderated discussion, 35 min Q&A, & 10 min closing remarks) Panelists: <i>Dr. Vladimir Shiltsev, Director, Accelerator Physics Center, Fermi National Laboratory Dr. Sarah Cousineau, Section Head, Accelerator Science and Technology, Oak Ridge National Laboratory Dr. Leonid Rivkin, Professor Emeritus, Paul Scherrer Institute</i> | |
| 12:15 PM | Break | |

* Placeholder Title – To Be Updated Closer to Meeting Date

12:45 PM

Panel 2: Technical and Timeline Feasibility of a Muon Collider

(15min each talk, 20 min discussion period, & 10 min closing remarks)

Panelists: ***Dr. Thomas Roser, Senior Scientist Emeritus, Brookhaven National Laboratory***
 Dr. Daniel Schulte, Senior Physicist, CERN
 Dr. Mark Palmer, Director, Accelerator Science & Technology Initiative, Brookhaven National Laboratory

2:15 PM

Meeting Adjourns to Closed Session (or at a time at the discretion of the Co-Chairs)

The following information is provided for any members of the general public who may be in attendance:

This meeting is being held to gather information to help the committee in its charge. This committee will examine the information and material obtained during this, and other public meetings, in an effort to inform its work. Although opinions may be stated and lively discussion may ensue, no conclusions are being drawn nor will recommendations be made. Observers who draw conclusions about the committee's work based on this meeting's discussions will be doing so prematurely.

Furthermore, individual committee members often engage in discussion and questioning for the specific purpose of probing an issue and sharpening an argument. The comments of any given committee member may not necessarily reflect the position he or she may actually hold on the subject under discussion, to say nothing of that person's future position as it may evolve in the course of the project. Any inference about an individual's position are therefore also premature.

NOTES FOR PRESENTERS

Your presentation may not include unpublished data, ITAR controlled and/or other sensitive information.

At some point a staff member will be asking you to sign a consent form allowing us to use your presentation, specifically to post it on our website.

STATEMENT OF TASK

Task Initiated on 25 August 2021

The National Academies of Sciences, Engineering, and Medicine will convene an ad hoc committee to:

- Identify the fundamental questions in particle physics that could motivate research in the next decade and beyond, irrespective of the tools and techniques to address them.
- Distinguish which of these questions could be addressed with available experimental and theoretical tools in the coming decade and which could require new techniques or approaches.
- Suggest technical research areas that could provide particle physics with new tools needed to enable new techniques and approaches.
- Suggest different ways of thinking and alternative approaches from other areas of science that could be incorporated into and benefit the overall particle physics enterprise.

Panelist Biographies

SARAH COUSINEAU is the section head for Accelerator Science and Technology at Oak Ridge National Laboratory (ORNL). Cousineau's research efforts have covered collective effects in beams including space charge and instabilities, high power beam collimation, novel beam instrumentation and diagnostics methods, charge exchange injection methods, simulation of high intensity beam dynamics, and machine learning for accelerator applications. Cousineau joined ORNL during the commissioning of the Spallation Neutron Source accelerator and participated in the commissioning and power ramp up of the accelerator complex. Previously, Cousineau was the group leader of the ORNL Beam Science and Technology group and also held a joint faculty appointment with the University of Tennessee. Cousineau has served as chair of the American Physical Society (APS) Division of Physics of Beams and is a faculty member and the Curriculum Chair for the US Particle Accelerator School. Cousineau is a fellow of APS. Cousineau earned a Ph.D. in physics from Indiana University.

MARK PALMER is the director of the Accelerator Test Facility (ATF), a user facility supporting advanced accelerator R&D, at Brookhaven National Laboratory. Palmer also coordinates Brookhaven's Accelerator Science and Technology Initiative. Palmer's research is focused on gravitational, high energy and accelerator physics. Previously, Palmer headed the U.S. Muon Accelerator Program, which carried out research to develop muon accelerator technologies for future neutrino beam and lepton collider facilities. Palmer was also part of the International Linear Collider design team and helped lead the CESR Test Accelerator research program at Cornell University. Palmer earned a Ph.D. in physics from Princeton University.

LEONID (Lenny) RIVKIN is at the Paul Scherrer Institute (PSI) and professor emeritus of particle accelerator physics at École Polytechnique Fédérale de Lausanne (EPFL). Upon joining PSI, Rivkin worked on the design, construction, and commissioning of the Swiss Light Source. Rivkin's previous positions include PSI Deputy Director and Head of the Department of Large Research Facilities at PSI. Rivkin serves as chair of the Executive Board of the Swiss Accelerator Research and Technology Collaboration, the CERN Scientific Policy Committee, and the League of European Accelerator based Photon Sources. Rivkin has served on multiple international advisory committees, including the European Laboratory Directors Group, the Test Infrastructure and Accelerator Research Area Governing Council, and the Stanford Synchrotron Radiation Lightsource Scientific Advisory Committee. Rivkin is a fellow of the American Physical Society and has received the Silberne Ehrennadel from the Deutsches Elektronen-Synchrotron (DESY). Rivkin earned a Ph.D. in physics from the California Institute of Technology.

THOMAS ROSER is senior scientist emeritus in the Collider Accelerator Department at Brookhaven National Laboratory (BNL). Roser has served as a senior scientist, Deputy Associate Laboratory Director for Accelerators, and Chair of the Collider-Accelerator Department at BNL with responsibility for the operation of the Relativistic Heavy Ion Collider (RHIC). Roser oversaw the high intensity beam development at the Alternating Gradient Synchrotron and led the commissioning of RHIC. Prior to joining BNL, Roser was an assistant professor at the University of Michigan, working on spin effects in high-energy elastic pp scattering and acceleration of polarized proton beams. Roser is a fellow of the American Association for the Advancement of Science, the American Physical Society, and the Institute of Electrical and Electronic Engineers (IEEE). Roser has received BNL's Sambamurti Memorial Lectureship Award, the BNL Science and Technology Award, and the Nuclear and Plasma Sciences Society/IEEE Particle Accelerator Science and Technology Award. Roser earned a Ph.D. in nuclear physics from the Federal Institute of Technology (ETH), Zurich.

DANIEL SCHULTE is a Principal Applied Physicist at CERN. Schulte is currently leading the institution's muon collider study. Schulte's work focuses on beam-induced detector background, beam physics and accelerator design. Schulte has been involved with multiple projects at CERN including CLIC, LHC, ILC and FCC-hh. Schulte earned a Ph.D. in physics from the Hamburg University.

VLADIMIR SHILTSEV is Distinguished Scientist and researcher in the accelerator division at Fermi National Accelerator Laboratory (Fermilab). Shiltsev's research focuses on modern and future colliders with significant contributions to beam physics, space-charge and beam-beam effects and their compensation, particle collimation and beam emittance control; design of large hadron colliders, linear "e+e-" colliders and muon colliders. Shiltsev led the Tevatron collider department and the Fermilab Accelerator Physics Center while serving as chair of the division of physics of beams in the American Physical Society (APS). Shiltsev is a fellow of the American Association for the Advancement of Science, APS, and the Institute of Electrical and Electronic Engineers, and a member of the European Academy and the Bologna Academy of Sciences. Shiltsev is also the recipient of APS's Robert H. Siemann Award, the European Physical Society's European Accelerator Prize, the George Gamow Award and the International Nishikawa Accelerator Prize. Shiltsev earned a Ph.D. in accelerator and beam physics from Budker Institute of Nuclear Physics.